**Bases for the improvement of latex production and tolerance of exploitation stress in *Hevea***

*P. Montoro, M.P. Carron, A. Clément-Demange, L. Lardet, J. Leclercq*

*UMR DAP, CIRAD, France*

Since 1920, the development of budded rubber tree clones on rootstocks grown from seeds has considerably increased the uniformity of plantations, enabled efficient genetic improvement for adaptation to tapping stress and hormonal stimulation (ethylene), and has facilitated the dissemination of selected planting material to farmers.
However, this varietal type does not enable: a) genetic improvement of the root section, b) maintenance of juvenility in the aerial section with its assumed agronomic advantages and c) modification of clones by genetic transformation. Based on somatic embryogenesis or microcutting procedures established at CIRAD, different new varietal types have been produced in the laboratory and tested in the field, such as whole plants (*in vitro* plantlets), budded plants rejuvenated by somatic embryogenesis, rootstock clones, or transgenic plants, in conjunction with CNRA (Ivory Coast), Michelin (Nigeria and Brazil), and RRIT (Thailand). At the current stage of research focusing on rejuvenation, clones of whole *in vitro* plantlets, or budded plants derived from the primary somatic embryogenesis procedure, and for which the juvenility naturally associated with zygotic embryogenesis has been re-established, perform as least as well as so-called "mature budded" conventional clones devoid of juvenility. CIRAD is also developing a procedure to establish lines of embryogenic friable callus, followed by cryopreservation to enable the selection of high-performance embryogenic lines with a view to mass propagation of whole, unbudded clones endowed with a single genotype in the root and aerial sections.
CIRAD is also developing genomic approaches focusing on the identification of QTLs, their labelling with SSR (microsatellite) type genetic markers, and the identification of candidate genes. Transcriptome analysis is focusing on identifying transcription factors and key genes promoting stress tolerance and optimization of latex yields. This research is intended to specify the genetic determinism of traits associated with latex production, in the conceptual framework of the metabolic typology of clones established by a biochemical diagnosis method (latex diagnosis). Identification of a QTL with an important effect indicates that latex production, when subjected to abiotic tapping stress, seems to be highly regulated by a small number of genetic factors which might be identified by mapping candidate genes. Apart from its prospects for improving clones, transgenesis is a research tool already being used to analyse the effects of oxidative stress and the detoxification system in the laticifer tissues of tapped trees, and their involvement in tapping panel dryness or brown bast. The very important effects of tapping along with artificial stimulation of latex production by ethephon application, on the hormonal regulation of laticifer tissue functioning, have led to studies on ethylene and jasmonate signalling in response to exploitation stress, regulation of ethylene and jasmonic acid biosynthesis, and interaction between those two hormones.